

General information

Glossary of abbreviations and acronyms used in this section

Term

- **AHJ** - Authority Having Jurisdiction
- **ANSI**- American National Standards Institute
- **DHI** - Door and Hardware Institute
- **FEH** - Fire Exit Hardware (Exit devices which are listed for both fire and panic applications)
- **FM** - Factory Mutual
- **IBC** - International Building Code
- **ITS/WHI** - Intertek Testing Services / Warnock Hersey
- **MPD** - Mortise Panic Device
- **NFPA** - National Fire Protection Agency
- **NFPA 80** - Nationally accepted standard for the use and installation of fire frames and doors
- **RPD** - Rim Panic Device
- **SD** - Steel Door Institute
- **UL** - Underwriters Laboratories
- **VRPD** - Vertical Rod Panic Device

Hourly ratings

Steel fire doors are rated by time (hours or minutes) that a door assembly can withstand exposure to fire test conditions. Hourly (minute) ratings are shown below:

| Hourly Ratings | | Description |
|-------------------------|--------|--|
| Door | Wall | |
| 3 hour (180 minutes) | 4 hour | Opening in walls separating buildings or dividing a building into fire areas. |
| 1 ½ hour (90 minute) | 2 hour | Openings in enclosed or vertical communications through buildings. These could be stairwells or elevator shafts. |
| 1 hour (60 minute) | 1 hour | Openings in corridors and room partitions dividing building into areas of occupancy. Historically, the 1 hour ratings have been wood door ratings. Steel doors are starting to be used in these openings depending on the AHJ. |
| ¾ hour (45 minute) | 1 hour | Openings in corridors and room partitions. |
| 1 ½ hour (90 minute) | 2 hour | Openings in walls where there is the potential of severe fire exposure from the exterior of the building. |
| ¾ hour (45 minute) | 1 hour | Openings in walls where there is the potential of moderate to light fire exposure from the exterior of the building. |
| 20 minute | 1 hour | Openings in corridors where smoke and draft control is required. |

Fire door assemblies:

Steelcraft fire rated doors, three sided frames, transom and/or sidelight frames and fire window frames are required to comply with building codes and the local AHJ. This section of the manual has been compiled as an aid to help understand the ratings of the door and frame products, and to provide a broad overview of the products Steelcraft offers to meet the increasingly stringent needs of the fire protection community.

Fire rated products - General information

Fire door assembly components

Care should be taken in the selection of the components used in a fire door assembly. If any of the listed components are omitted, or if a non-rated component is substituted, the door assembly rating will be violated. Fire rated components (with the exception of the wall) are listed in the UL Certifications Directory or the IT/WHI Directory of Listed Products.

Required Fire Door Assembly components are as follows:

- **Listed frames:** Frames are required to be labeled with the appropriate fire door frame label. The frame label carries an hourly rating, which is generally valid for any rating up to and including the rating on the label.
- **Listed doors:** Doors are required to be labeled with the appropriate fire door label. The fire door label carries an hourly rating. Doors can be labeled with a higher hourly rating than required, but, it is not acceptable to substitute a door with a lower hourly rating than required.
- **Listed hardware:** Most hardware components are also required to be labeled with the appropriate fire label. The location and type of label will vary with the device being used. The required minimum hardware components for a fire door assembly are as follows:
- **Listed latch or locking device:** may be single point locks, latches, fire exit devices or other listed devices.
- **Approved hinge(s):** may be butt hinges, pivots, continuous hinges or other approved hinge constructions. Hinges generally are not labeled.
- **Listed closing device:** may be surface mounted or concealed attachment to the door and frame.
- **Fire rated wall:** Wall construction must be fire rated as dictated by the building code and the AHJ.

The AHJ (Authority Having Jurisdiction)

The local AHJ must be the final authority in fire door assembly issues. Steelcraft Fire Doors and Fire Door Frames are produced under the listing programs of Underwriters' Laboratories Incorporated (UL) Warnock Hersey (IT/WHI) and FM Global (FM).

Installation

Installation of all Steelcraft doors and frames shall conform to the published Steelcraft installation instructions, and ANSI/SDI A250.11 *Recommended Installation Instructions for Steel Frames*, ANSI A250.11 and HMMA 840. All fire rated frames must be installed in accordance with NFPA 80, and/or the local AHJ.

Functions of fire door assemblies

Fire Doors must serve four main functions:

1. Serve as a regular door at all times.
2. Provide ready egress from a fire area during a fire.
3. Inhibit the spread of fire and smoke throughout the building or to an adjacent building.
4. Protect life and property by reducing smoke hazards.

When a fire starts, it is most important to evacuate the people safely from the building. After evacuation, the doors must serve as a fire and smoke barrier. It is a well known fact, that in a fire more people are killed by either smoke asphyxiation or by panic, than by the fire.

The same length of protection from the fire is not required of all openings in buildings. The location in the building determines the length of time that the door must withstand a fire. It is the responsibility of the building code and the AHJ to indicate the type of Fire Doors Assemblies that are to be used at the required locations in a building.

Fire rated steel frames and doors

Manufacturers of steel frames and doors choose from several methods of classifying their product as Fire Doors.

Municipalities, state governments, insurance regulations and building codes vary in the requirements for Fire Doors.

Users of fire doors can specify the type of label that offers the desired fire protection. Regardless of the label chosen, serious consideration should be given to the company manufacturing the product and the performance expected.

The National Fire Protection Association publishes NFPA Pamphlet 80, which is the generally accepted standard throughout the United States for the installation of fire doors and windows. This standard is generally accepted by state fire code officials and municipal building officials.

Some of the topics covered in NFPA Pamphlet 80 are:

- allowable glass area in doors for different locations and ratings
- maximum sizes for various kinds of fire doors
- latching device and hinge quantity
- dimensional requirements, as they relate to different ratings, sizes and types of fire door classifies a door or a frame only if it meets the following conditions

It is the responsibility of the architect and/or specification writer to specify the proper materials for complete safety. They should be aware of the issues that constitute maximum safety in Fire Frames and Doors. All persons responsible for the design, installation and operation of any building involving people or valued property should insist upon the type of labeled door and frame that will afford the maximum fire protection.

Fire rated products - General information

Listing agencies

- There are currently three (3) listing systems available from Steelcraft.
- Underwriters Laboratories (UL)** Fire Testing and Certification Program. UL is an independent agency with testing, listing, in-plant inspection, and labeling capabilities.
 - The manufacturer's design has been accepted by UL (under their performance standard UL10C or UL9) which uses NFPA Pamphlet 80 as the basis for their decision.
 - The door or frame is manufactured in accordance with the accepted design in the presence of a UL inspector.
 - The product passes the UL10C or UL9 fire test conducted by UL.
 - UL finds that the product meets the additional criteria (such as durability, stability, etc.) in addition to passing the fire test.
 - It is subject to a continual follow-up service, including unannounced, in-plant inspections during the manufacturing process to be sure that the frames and doors continue to be made exactly the same as tested.
 - Intertek Testing Services / Warnock Hersey (ITS/WHI)** Fire Testing and Certification Programs. ITS/WHI is an independent agency with testing, listing, in-plant inspection, and labeling capabilities.
 - The manufacturer may, at their option, submit drawings of the product to be tested to ITS/WHI for review. If potential problem areas are noted ITS/WHI will notify the manufacturer of these so that he may consider design changes.
 - IT/WHI personnel witness manufacturing of the product to be tested and verify components and assembly methods.
 - The product is then tested by ITS/WHI to determine if it meets the stringent requirements of the fire door test standards.
 - A factory follow-up inspection, listing and labeling agreement is issued. This agreement allows ITS/WHI to make unannounced in-plant inspections.
 - FM Global/Approvals** follow-up certification programs. FM Global is an independent underwriting agency with listing, in-plant inspection, and labeling capabilities.
 - Examine and test production samples
 - Examine manufacturing facilities and audit quality control procedures.
 - A factory follow-up inspection, listing and labeling agreement is issued. This agreement allows FM to make unannounced in-plant inspections.

Doors, frames, and walls

Frames and doors are normally rated at three-quarters of the rating of the walls. If the rating for the wall is 4 hours, the rating for the door and frame is generally 3 hours. If the rating for the wall is 2 hours, the rating for the door and frame would be 1 ½ hours, etc. There are two current exceptions to this practice: 20 min. openings used for smoke control applications and 1-hour openings. Both used in 1-hour walls.

The reason that door and frame assemblies are normally rated at 75% of the total ratings of the wall is that the actual fire testing program for walls is completely different than that of frames and doors and the requirements and acceptance criteria vary. It should also be noted that the severity of fire is generally considered to be less at a door opening than at a wall. Normally doorways are open for passage of pedestrians and walls have a tendency to have furniture and other items stored against them.

Steps to follow

- The following steps should be followed in specifying fire door requirements:
- Investigate the appropriate building code(s).
 - Determine the fire resistance of the wall or partition in which the opening is to be located and select a door assembly (frame, door and hardware) having a proper fire-protection rating. The effectiveness of the entire assembly as a fire barrier may be destroyed if any component is omitted or one of substandard quality is used.
 - Make sure that fire doors, frames and hardware are produced under the auspices of a nationally recognized certification agency.
 - Insure products comply with the AHJ.
 - Insure products comply with NFPA 80. This pamphlet is the widely accepted standard for the use and installation of fire frames and doors.

Fire testing

Steel frames and doors have historically been subjected to full scale fire tests as a standard method for evaluating their performance and integrity relative to fire protection of property and life safety. Hollow metal doors were first submitted to Underwriters Laboratories for investigation and fire exposure testing in 1904. The agencies now associated with the testing, listing and labeling of products are two well known entities, Underwriters Laboratories and ITS/Warnock Hersey.

While the agencies have remained a constant in the industry, the standards against which products are evaluated are undergoing significant changes. This document will provide an overview of the changes and describe how Steelcraft has positioned their product line in compliance with NFPA 252 and UL10C Positive Pressure Fire Tests of Door Assemblies or NFPA 257 and UL9 Fire Tests of Fire Window Assemblies..

Steelcraft frames and doors approved for positive pressure

The products that conform to the positive pressure criteria (UL10 C) or NFPA252 are shown on the following sheets. These products also conform to the negative pressure test criteria (ASTM E152, UL10 B, etc.) and may be used in areas that do not require positive pressure fire frames and doors.

Steelcraft products do not require the use of intumescent seals to comply with UL10 C or NFPA252.

Guidelines & requirements

All fire door applications are subject to product and component limitations and requirements. The following are general guidelines in the use and selection of fire rated assemblies and their components

1. Listed or approved fire door components are published and listed in Underwriters Laboratories' "Certifications Directory", the ITS/Warnock Hersey "Directory of Listed Products" or the online FM "Approval Guide".
2. Only labeled doors and frames can be used in a fire rated opening.
3. Every labeled swing type fire door must include an approved self latching device, closing device and hinges.
4. Viewers must be listed in the Underwriters Laboratories "Certifications Directory", the ITS/Warnock Hersey "Directory of Listed Products" or the online FM "Approval Guide".
5. The actual fire rating of a Fire Door Assembly is the rating of the least rated component (door, frame or hardware)
6. Approved electronic monitoring devices can be used on fire doors.
7. The local AHJ is the final authority in application acceptance.

Astragals

1. Astragals are required per the manufacturer's published listings.
 - Astragals may not be required on double egress or other applications with 1 ½ hour or less ratings. Refer to the appropriate listing pages in this section.
2. Astragals must be steel overlapping type. Weather stripping astragals rated for 3 hours (180 minutes) do not satisfy the astragal requirements for steel fire doors.
3. When astragals are used on pairs of doors equipped with fire exit hardware, a coordinator must be used to insure proper closing and latching sequence.
4. An astragal may be used on a pair of doors equipped with a mortise exit device on the active leaf and a vertical rod on the inactive leaf.
5. An astragal can not be used on pairs of doors swinging in the same direction equipped with double vertical rods, since the astragal will prevent the operation of one of the door leaves. Since 3 hour (180 minute) rated openings require an astragal, double vertical rod applications can not be used in pairs swinging in the same direction.
6. Astragals can be either screw attached or welded to the appropriate door.
7. Astragals are not used on pairs of doors with an open back strike.

Clearances

All clearances must be in accordance with NFPA Pamphlet # 80.

Closing devices

1. An approved closing device must be installed on every swinging fire door. Exception:
 - The inactive leaf of mechanical equipment room doors may omit a closer. Verify acceptance with the local building code and the AHJ.
2. Fire doors must be internally reinforced for closing devices. Exceptions:
 - Internal reinforcement is omitted if the closer is attached with sex bolts.
 - Internal reinforcement is omitted if spring hinges are used.
3. Overhead stops may be used if they do not inhibit the door from closing and latching.
4. Door holder/release devices are permitted when acceptable to the AHJ. These fail-safe devices release the door in the event of fire.
5. Labeled opening may incorporate concealed closers and stops.

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Coordinators

1. A coordinator is required if an astragal or projecting latch bolt prevents the inactive door from closing before the active door.
2. A coordinator is not required if both leafs of a pair of doors closes and latches independently of each other.
3. When astragals are used on pairs of doors equipped with fire exit hardware, a coordinator must be used to insure proper closing and latching sequence.

Dutch doors

1. The upper and lower leaf may latch into the frame or the upper leaf may latch into the lower leaf, which latches into the frame.
2. The opening must include a closing device located on the upper leaf, and a horizontal astragal which will coordinate the closing and latching of the bottom leaf.
3. A label is required on each leaf of a dutch door and one on the frame.

Exit devices

1. Listed Fire Exit Hardware must be used. These exit devices are listed for both fire and panic applications.
2. The door size must not exceed the maximum listed size for the individual hardware manufacturers' listing for the device being used.
3. Doors which are reinforced for Fire Exit Hardware must bear a label which states "Fire Door to be Equipped with Fire Exit Hardware".
4. Vertical rod FEH may not be used on single doors. The exception would be a listed 3 point exit device.
5. Pairs of doors, swinging in the same direction, with vertical rod FEH on both leaves can not be used in 3 hour (180 minute) applications.
6. Rim FEH can not be installed with blade strikes in double door applications.
7. Rim FEH in pairs must include the use of a listed hardware mullion.

Gasketing & edge seals

1. Only listed gasket material can be used. Refer to the UL Fire Resistive directory or the ITS/WHI Directory of Listed Products.
2. Smoke and draft control assemblies must include gaskets listed for smoke and draft control.
3. Steelcraft fire rated doors do not require the use of edge seal (intumescent) systems.

Glass & glazing

1. Only approved glass can be installed in a fire door assembly.

Hinges

1. The proper quantity of hinges must be used. Based on NFPA Pamphlet 80:
 - Doors up to 60 inches in height shall be provided with 2 hinges and an additional hinge for each additional 30" of door height or fraction there of.
2. Steelcraft doors over 96 inches may be prepared for .134" standard weight hinges.
3. Listed continuous hinges, electric hinges and pivots can be used on Steelcraft fire rated doors.
4. Doors with 4" hinges are limited to 20 gauge and a maximum door size of 3'0" x 7'0".

Labels

1. Steelcraft doors and frames can be supplied with a variety of metal or Mylar fire labels, attached by permanent adhesive. Other methods of attachment have been welding, rivets or drive screws.
2. Labels are attached only at the factory or at an authorized labeled distributors' shop.
3. All jobsite labeling must include a field (jobsite) inspection by the labeling agency and may require involvement of the AHJ.
4. Fire rated doors with continuous hinges have the fire label attached in the top channel of the door.

Locks

1. The door size must not exceed the maximum listed size for the individual hardware manufacturers' listing.
2. Dead locks may not be used on doors which are in a means of egress. Locks with deadbolts that are interconnected with latch bolts are retracted simultaneously when the latch bolt is retracted may be used with in a means of egress.
3. Deadbolts may be used on doors in addition to an active latch bolt on doors not in the means of egress, or as otherwise permitted by the AHJ.

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Louvers

- Any listed automatic fusible link louver can be used on a Steelcraft labeled door.
- Glass lights are not permitted in doors equipped with louvers.
- Fire Exit Hardware can be used on doors equipped with a louver, but only where approved by code.
- Fire ratings for doors equipped with a louver can be either 1 ½ hour (90 minutes) 1-hour (60 minutes) or ¾ hour (45 minutes).
- Maximum listed louver size 24" x 24" (one louver per door)
- Location in the door:
 - Located in bottom half
 - Minimum 12" from door bottom
 - Minimum 5 ½" from door edge to cutout.
- Louvers cannot be installed in a means of egress and in:
 - The upper half of the door
 - 20 minute doors
 - Smoke & draft opening

Latch throw

- Single doors:
 - ½" latch bolt throw for all door series, gauges and fire ratings.
- Pairs of doors
 - A Series = ⅝"
 - B Series
 - B18, B16 = ⅝"
 - B14 = ⅝" For pairs of doors up to and including 1 ½ hour (90 minute) and ¾" over 1 ½ hour
 - L Series:
 - L20, L18, L16 = ⅝" up to 3 hours
 - L14 = ⅝" For pairs of doors up to and including 1 ½ hour (90 minute). ¾" over 1 ½ hour
 - T Series = ¾"

Pairs of doors

- The inactive leaf of doors must be provided with self-latching top and bottom bolts or automatic flush bolts or labeled two point latches. Manual flush bolts either mortised or surface may be used on doors to rooms not normally occupied by humans.
- Double egress doors can only be provided with concealed or surface vertical rod FEH.
- Open back strikes can be used on pairs of doors (L18/16/14, CE18/16, B18/16/14). Maximum height of 8'0" and a maximum 1 ½ hour (90 minute) ratings. Astragals can not be used in this application.
- Two doors in the same frame separated by a hollow metal mullion are considered to be two single doors applications.

Protective plates & plant-ons

- Protection plates or kick plates can be a maximum 48" x 48" in size and attached to both faces of a door (3 hour maximum fire rating).
- Plant-ons can be used if covered by a manufacturer's listing service.

Smoke & draft

- All components used in a Smoke and Draft Control assembly must pass a 20 minute without hose stream test.
- Only gaskets listed for smoke and draft control may be used on smoke and draft control assemblies.
- Gaskets must be listed for the appropriate door type (hollow metal, wood, etc.).
- Wood doors which do not have an integral intumescent seal in the door edge, may require an intumescent edge seal and draft control gasket attached to the frame. Review the wood door manufacturer's listing and requirements.

Temperature rise doors

- Steelcraft T Series doors prepared for single point latches, rim or mortise FEH are labeled for 250°F temperature rise and may be used in either 250°F or 450°F temperature rise location.
- Doors prepared for vertical rod (CVR or SVR) or INPACT™ devices carry a 450°F temperature rise label and can only be installed in 450°F temperature rise location.

Vision light requirements

- Glass cannot be installed in exterior locations subject to severe fire exposure.
- Any listed fire door vision kit can be used in a Steelcraft door. Vision kits should be listed for the appropriate door construction (hollow metal, wood, etc.) used.
- Steelcraft vision kits are not approved for use in any other door manufacturers' doors